

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 07-331653

(43)Date of publication of application : 19.12.1995

(51)Int.Cl.

E02D 5/54

(21)Application number : 06-123933

(71)Applicant : TANAKA HIDEKAZU

(22)Date of filing : 06.06.1994

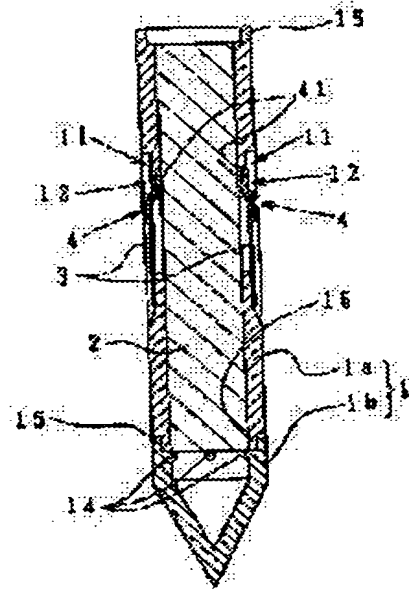
(72)Inventor : TANAKA HIDEKAZU

## (54) FOUNDATION PILE

### (57)Abstract:

**PURPOSE:** To increase bearing power while saving the workhours of driving in a foundation pile.

**CONSTITUTION:** A foundation pile consists of a cylindrical pile 1, in which a pile nose section is mounted at a lower end, a core member 2 slidably housed in the cylindrical pile 1 and a plurality of bearing pieces 3, 3 housed in the drum section of the cylindrical pile 1 in a freely projecting and retreating manner and oppositely placed under the state of interlocking to the core member 2. The relationship of contraposition is set in relationship, in which the bearing pieces 3, 3 are projected from the cylindrical pile 1 by the downward pushing of the core member 2.



## LEGAL STATUS

[Date of request for examination] 09.06.1997

[Date of sending the examiner's decision of rejection] 09.03.1999

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2003 Japan Patent Office

## \* NOTICES \*

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.

2. \*\*\*\* shows the word which can not be translated.

3. In the drawings, any words are not translated.

---

## CLAIMS

---

[Claim(s)]

[Claim 1] \*\*\*\* (1) which prepared \*\*\*\*\* in the lower limit This \*\*\*\* (1) Core part material (2) held free [ sliding ] inside Said \*\*\*\* (1) It holds in a drum section free [ frequent appearance ], and is core part material (2). It consists of two or more pieces of support (3) which it received and changed the pair of element into the interlocking condition, and (3). said pair of element relation — core part material (2) pushing in a lower part — said piece of support (3), and (3) — \*\*\*\* (1) from — foundation pile considered as the projecting relation.

[Claim 2] Each piece of support (3) \*\*\*\* (1) The upper part of opening (12) which the upper limit section established in the bottom wall section of cavity (11) while holding in cavity (11) prepared in drum section external surface is minded, and it is core part material (2). Foundation pile according to claim 1 considered as the configuration connected free [ vertical rotation ].

[Claim 3] each piece of support (3) \*\*\*\* (1) a drum section configuration wall — the inside and outside — sliding — possible — penetrating — among those, the side edge section — \*\*\*\* (1) inside — a projection and core part material (2) \*\*\*\* — foundation pile according to claim 1 which established the inclination pressurization side (21) which counters from the slanting upper part in said inside edge.

[Claim 4] \*\*\*\* (1) Core part material (2) It consists of a pile point cylinder part (1b) which the main cylinder section (1a) to hold and this main cylinder section (1a) are formed in another object, and is connected with the lower limit of \*\*\*\*\*. The connection section of these main cylinder section (1a) and a pile point cylinder part (1b) It considers as the configuration into which the 1st fitting cylinder part (16) made to project from the main cylinder section (1a) and the 2nd fitting cylinder part (15) made to project from a pile point cylinder part (1b) fit in and abroad densely. In the upper limit section of the main cylinder section (1a) Said 2nd fitting cylinder part (15) is made to project, and it is said core part material (2). Foundation pile given in either of claim 1 to claims 3 which made the die length from the lower limit of the 2nd fitting cylinder part (15) in the main cylinder section (1a) to the lower limit of the 1st fitting cylinder part (16) carry out abbreviation coincidence of the die length.

---

[Translation done.]

**\* NOTICES \***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**DETAILED DESCRIPTION**

---

[Detailed Description of the Invention]

[0001]

[Application of the Invention] Especially, this invention is used for a foundation pile and comparatively shallow pile foundation, and relates to the foundation pile constructed by placing.

[0002]

[The conventional technique and a technical problem] Generally, the load of the structure with which the above-mentioned foundation piles are formed successively by the frictional resistance force between the soil which mainly touches that peripheral face and this in the upper part of this pile is supported. And in the large thing of this load, bearing capacity is enlarged by enlarging the die length and the cross-section dimension of a pile, and increasing a touch area with soil. However, since the drag force of placing also increases in proportion to said dimension increase, the working hours of placing increase.

[0003] It makes it the technical problem to enable it to increase bearing capacity, this invention being made in view of such a point, and suppressing the working hours of placing in the above-mentioned foundation pile.

[About invention of claim 1]

[0004]

[Technical Means] The technical means of this invention devised in order to solve the above-mentioned technical problem The core part material held free [ sliding ] in "\*\*\*\* (1) which prepared \*\*\*\*\* in the lower limit and this \*\*\*\* (1) (2), Said \*\*\*\* (1) It holds in a drum section free [ frequent appearance ], and is core part material (2). It consists of two or more pieces of support (3) which it received and changed the pair of element into the interlocking condition, and (3). said pair of element relation — core part material (2) pushing in a lower part — said piece of support (3), and (3) — \*\*\*\* (1) from —" considered as the projecting relation — they are things.

[0005]

[Function] The above-mentioned technical means of this invention act as follows. construction of this pile — facing — \*\*\*\* (1) the — until penetrating of the whole is carried out mostly in the earth — devoting oneself — next and core part material (2) two or more pieces of support (3) connected or interlocked with this when pushed in caudad, and (3) — \*\*\*\* (1) from — it will be in the condition of having projected and having been pushed in into soil. At this thing, it is \*\*\*\* (1). The load of the structure formed successively by the upper part of this pile according to the frictional resistance force between a peripheral face and the soil of that perimeter is supported. it — in addition, said piece of support (3) and (3) support by soil — having — \*\*\*\* (1) Since it becomes what is supported, said load is supported by the piece of these support (3), and (3).

[0006]

[Effect] Since this invention is the above-mentioned configuration, it has the following characteristic effectiveness. At this thing, it is \*\*\*\* (1). Since the load which acts on this pile also according to the bearing capacity by the piece of support (3) and (3) in addition to the frictional resistance force given to a peripheral face is supported, the bearing capacity of this whole pile improves compared with the thing of the same conventional die length and cross-

section dimension which does not prepare the piece of these support (3), and (3).

[0007] On the other hand, in this thing, since a load is supported by the above-mentioned frictional resistance force and the bearing capacity of the piece of support (3), and (3), even when a load is large, it is necessary to enlarge neither the length nor a cross-section dimension so much. moreover, this placing — \*\*\*\* (1) from — it is carried out in the condition that the piece of support (3) and (3) do not project. Therefore, the drag force of this placing is comparatively small, and the working hours of placing do not become so large.

[invention of claim 2] — invention of this claim 2 It sets to invention of above-mentioned claim 1, and is core part material (2). When the piece of support (3) and (3) are connected, the above-mentioned support by the piece of support (3) and (3) is enabled. The technical means for it It is what "each piece of support (3) considered as the configuration in which the upper limit section is connected with core part material (2) free [ vertical rotation ] through the upper part of opening (12) established in the bottom wall section of cavity (11) while being held in cavity (11) prepared in the drum section external surface of \*\*\*\* (1)."

[0008] At this thing, it is each piece of support (3). The upper limit section minds the upper part of opening (12), and it is core part material (2). Since it is connected free [ vertical rotation ], it is core part material (2). When it pushes in, they are this and said piece of support (3). The connection section is depressed and it is a piece of support (3). It projects caudad out of cavity (11). At this time, it is a piece of support (3). It is pushed in into soil in the condition of having opened outside further, from projecting out of cavity (11) in the condition of having been rocked outside slightly, and receiving the drag force of soil from a lower part. The piece of support (3) and (3) are \*\*\*\* (1) in this condition. It supports.

[0009] At this thing, it is core part material (2). It is the easy configuration with which the piece of support (3) and (3) were connected free [ rocking ], and the above-mentioned support by the piece of support (3) and (3) is possible.

[invention of claim 3] — invention of this claim 3 It sets to invention of above-mentioned claim 1, and is core part material (2). When the piece of support (3) and (3) are considered as the interlocking configuration The above-mentioned support by the piece of support (3) and (3) is enabled. The technical means for it It is what "each piece of support (3) established for the inclination pressurization side (21) where it penetrates possible [ sliding of the inside and outside ] in the drum section configuration wall of \*\*\*\* (1), among those the side edge section counters a projection and core part material (2) from the slanting upper part in \*\*\*\* (1) at said inside edge."

[0010] At this thing, it is a piece of support (3). \*\*\*\* (1) While penetrating possible [ sliding of those inside and outside ] in a drum section configuration wall To the inside edge, it is core part material (2). Since an inclination pressurization side (21) counters from the slanting upper part, it is core part material (2). When it pushes in caudad, an inclination pressurization side (21) is a piece of support (3). It extrudes outside. By this piece of support (3) a lateral part — \*\*\*\* (1) from — it projects, is pushed in into soil and will be in the above-mentioned support condition by the piece of support (3), and (3).

[0011]

[Example] The example of this invention is explained based on a drawing below.

[Example 1] This example 1 is \*\*\*\* (1) as stated above, as it corresponds to claim 1 and claim 2 as stated above and is shown in drawing 1 and drawing 2 . The main cylinder section (1a) and this main cylinder section (1a) of an abbreviation square cross section consist of pile point cylinder parts (1b) by which are formed in another object and connection unification is carried out in the lower limit of \*\*\*\*\*,

[0012] [the configuration of each part] — both said main cylinder section (1a) and a pile point cylinder part (1b) are the products made of synthetic resin strengthened by the glass fiber, the fixed range from the upper limit of said pile point cylinder part (1b) serves as said main cylinder section (1a) and a square case section of the same cross-section dimension, and square drill-like \*\*\*\*\* are formed successively by the bottom. And fitting of the 1st fitting cylinder part (16) which made the inner circumference section of the main cylinder section (1a) project caudad, and the 2nd fitting cylinder part (15) which made the periphery section of a pile point

cylinder part (1b) project up is carried out in and abroad densely, and it pastes up, and the connection section of these main cylinder section (1a) and a pile point cylinder part (1b) is unified. Furthermore, the same 2nd fitting cylinder part (15) as the above is prepared in the upper limit section of the main cylinder section (1a), and it enables it to connect another main cylinder section (1a) further on the main cylinder section (1a) by this in this example. In addition, at this example, it is \*\*\*\* (1). About 1–2m and breadth are set to about 10–15cm, and thickness is set to about 2–3cm for die length.

[0013] and the cavity of the shape of a rectangle opened outside in the same height location of the fourth page in the middle of said main cylinder section (1a) — (11) prepares — having — each cavity — opening (12) of the shape of a long rectangle is prepared in the vertical direction at the bottom wall section of (11). Moreover, the prismatic form core part material same [ that sliding becomes free to this in this main cylinder section (1a) ] made of synthetic resin as the above (2) It is inserted and is this core part material (2). Die length Abbreviation coincidence is carried out with the die length from the lower limit of the 2nd fitting cylinder part (15) in said main cylinder section (1a) to the lower limit of the 1st fitting cylinder part (16). Furthermore, this core part material (2) A lower limit engages with two or more small projections (14) prepared in the upper limit inner circumference section of the above-mentioned pile point cylinder part (1b), and (14), and, thereby, is core part material (2). It is maintained by the descent inhibition condition.

[0014] Furthermore, piece of support made from the steel plate of the shape of an abbreviation isosceles triangle which becomes level [ the surface ] in each above-mentioned cavity (11) (3) It holds and is this piece of support (3). The upper limit section is a hinge (4). It minds and is core part material (2). It is connected free [ rocking ]. Said hinge (4) It is located in the upper part of the above-mentioned opening (12), and is core part material (2). It was formed in the shape of a cross section of L characters, the lower limit has projected in cavity (11), and, thereby, a near attachment substrate (41) is a piece of support (3). It becomes an parallel posture to cavity (11). Moreover, the lower limit edge of cavity (11) serves as an inclined plane it turns [ inclined plane ] to a top, and is this and a piece of support (3). The lower limit crowning is carrying out abbreviation coincidence. Thereby, it is the above-mentioned core part material (2). Piece of support depressed by sliding to a lower part (3) It projects smoothly in a slanting lower part from cavity (11). In addition, at this example, it is a piece of support (3). Die length is set as about 10–15cm, and thickness is set as about 3–10mm.

[0015] In addition, the above-mentioned core part material (2) The die length to a lower part on which it can be slid is a piece of support (3). It is set up with the movable die length to a lower part, and the die length of the square case section of the main cylinder section (1a), and both have done abbreviation coincidence.

[the actual condition of placing] — the time of construction of this pile — \*\*\*\* (1) the — it is devoted until penetrating of the whole is mostly carried out into soil. At this time, it is core part material (2). It is maintained by the above-mentioned descent inhibition condition. then, core part material (2) the voice which carries out a predetermined die-length protrusion rather than the upper limit of the main cylinder section (1a) — pushing rod [ like ] (5) laying — this pushing rod (5) It pushes in caudad. At this time, it is core part material (2). It is pushed in caudad, crushing a small projection (14) and (14). In coincidence, the piece of support (3) and (3) project from cavity (11) at a slanting lower part, as described above. At this time, penetrating of them is carried out into soil, each tip opening the piece of support (3), and (3) outside by the drag force received from soil, and, finally they will be in the condition of having opened the degree of predetermined angle, as [ show / in drawing 3 ]. Furthermore, the next and above-mentioned pushing rod (5) It removes, and fitting is densely carried out into the main cylinder section (1a), and it is core part material (2) about a lower limit. Cap possessing the fitting section (61) of the abbreviation square cross section whose opposite \*\* was made possible (6) The main cylinder section (1a) is pasted (condition of drawing 3 ). Thereby, it is \*\*\*\* (1). Core part material (2) It is unified.

[0016] in this thing, the load of the structure formed successively by the upper part of this pile according to the frictional resistance force between the peripheral face of the main cylinder section (1a) and soil is supported — in addition, said load is supported by the piece of support

(3), and (3). Moreover, the piece of support (3) and (3) are \*\*\*\* (1). Since it is prepared in the same height location which can be set at the fourth page, it is these to \*\*\*\* (1) at the time of penetrating to the soil of the piece of these support (3), and (3). By the reaction force which acts, it is \*\*\*\* (1). Bending stress does not act.

[0017] And it is \*\*\*\* (1) when placing was completed in this thing. Core part material (2) Since it is unified, even if it produces some fluctuation on the foundation after this placing, they are these \*\*\*\* (1). Core part material (2) It is not displaced relatively. Furthermore, since it is the configuration which the main cylinder section (1a) described above in the thing of this example 1, as shown in drawing 4 On the main cylinder section (1a), another main cylinder section (1a) can be connected further, and it is core part material (2). Since it is set as the above-mentioned die length, it sets in said connection condition, and it is each core part material (2) in the main cylinder section (1a) (1a). It opposite-\*\* up and down. Core part material of the upper main cylinder section (1a) by this (2) It is the core part material (2) of the downward main cylinder section (1a) by pushing in. It is pushed in and each piece of support (3) and (3) are pushed in into soil. In this thing, two or more main cylinder sections (1a) (1a) are connected continuously, and it is \*\*\*\* (1). An overall length can be enlarged and increase of the friction bearing capacity of the pile peripheral face by this and increase of the bearing capacity by the piece of support (3) and (3) increasing can be aimed at.

[0018] In addition, at the thing of this example 1, it is \*\*\*\* (1). And core part material (2) Since it is formed with the above-mentioned synthetic resin, the thing of high intensity can be realized by being comparatively lightweight, and conveyance of this and the workability at the time of placing improve. Moreover, although this is driven even into the bottom of a water table, there is almost no corrosion of this.

[Modification(s)]

\*\* . The quality of the material of each part which constitutes this pile may not be limited to the thing of the above-mentioned example 1, and other quality of the materials are sufficient as it. For example, core part material (2) It is good also as metal.

[0019] \*\* . At the above-mentioned example 1, it is a cap (6). The main cylinder section (1a) is pasted and it is \*\*\*\* (1). Core part material (2) Although it unifies, it is not limited to this, and they are these \*\*\*\* (1). Core part material (2) The method which slushes adhesives into the sliding section and is united with it may be used. Moreover, these \*\*\*\* (1) Core part material (2) Even if it does not unify, it is good for both the structures with which both upper limit is formed successively on this pile also as an opposite-\*\*(ed) configuration.

[0020] \*\* . Although carried out in the above-mentioned example 1 to the comparatively small foundation pile of die length and a cross-section dimension, it cannot be overemphasized that it can carry out also to a foundation pile with these large dimensions.

[Example 2] This example 2 corresponds to claim 1 and claim 3 as stated above, and when [ of that die length and a cross-section dimension ] comparatively large, it is carried out. And \*\*\*\* as stated above (1) As shown in drawing 5 and drawing 6 , while forming in a cross-section round shape, from the \*\*\*\*\* to the pile top section is made into the product made from a reinforced concrete of one.

[0021] This \*\*\*\* (1) Two or more insertion pores (18) of the shape of a rectangle penetrated to radial [ that ] and (18) are prepared in a drum section, and that circumferential direction pitch and the direction pitch of an axis are fixed. And piece of support made from the heavy-gage steel plate of abbreviation trapezoidal shape with the lower side long in each insertion pore (18) (3) It holds possible [ sliding ] and is this piece of support (3). Piece of tacking for preventing the protrusion to the outside in a free condition (S) It has fixed in the outside lower limit section of said insertion pore (18).

[0022] and this \*\*\*\* (1) Core part material (2) of the product made from a steel pipe inside it holds possible [ sliding ] — having — this core part material (2) \*\*\*\* — It is made to correspond to the direction pitch of an axis of said insertion pore (18) and (18), the annular crevice (2a) (2a) is prepared, and the inside edge of the above-mentioned piece of support (3) and (3) is held in these annular crevices (2a) (2a). And the inclination pressurization side (21) it turns [ side ] to a lower part is established in each annular crevice (2a), and this inclination

pressurization side (21) is a piece of support (3). The inside oblique side is countered from the slanting upper part. In addition, this core part material (2) The upper limit section is \*\*\*\* (1). Support annular plate whose upper limit side was made to opposite-\*\* (N) A screw stop is carried out to the support cylinder (N1) which made it stand straight from the inner circumference section, and it is this core part material (2). \*\*\*\* (1) The receiving relative position is maintained uniformly. Moreover, it sets in this condition and is core part material (2). A lower limit and \*\*\*\* (1) A predetermined gap is prepared between partes basilaris ossis occipitalis, this removes the above-mentioned screw stop, and it is core part material (2). The die length at the time of pushing in caudad which can be pushed in is set up.

[0023] [the actual condition of placing] — this thing — an example 1 — the same — carrying out — \*\*\*\* (1) It is devoted in the earth. In addition, at this time, as shown in drawing 6, it is \*\*\*\* (1). It is a protective cap (C) to the upper limit section. The crown-ed is carried out, this is minded and it is \*\*\*\* (1). It is devoted. \*\*\*\* (1) When all were driven in mostly, they are the above-mentioned support cylinder (N1) and core part material (2). The screw to fix is removed and it is a support annular plate (N). It removes and is next and core part material (2). If it pushes in the piece of support (3) and (3) pressurize outside by the inclination pressurization side (21) of this, and (21) — having — the above-mentioned piece (S) of tacking extruding — the lateral part of the piece of these support (3), and (3) — \*\*\*\* (1) from — it projects, and it is carried out and penetrating is carried out into soil (condition of the two-dot chain line of this drawing).

[0024] Also at this example 2, it is \*\*\*\* (1). Since the bearing capacity by the piece of support (3) and (3) is added in addition to the friction bearing capacity of a peripheral face, the bearing capacity of this whole pile increases. moreover, each piece of support (3) \*\*\*\* (1) from — although the amount of protrusions is comparatively small compared with the thing of an example 1 — this piece of support (3) Since a large number are prepared, the above-mentioned frictional resistance force by this becomes sufficient thing.

[0025] [Modification(s)]

\*\* . The quality of the material of each part of the above-mentioned example 2 may not be limited to the above-mentioned thing, and other quality of the materials are sufficient as it. For example, \*\*\*\* (1) It is good also as a steel pipe.

\*\* . Although considered as the comparatively large thing of die length and a cross-section dimension in the above-mentioned example 2, it is good also considering this as magnitude comparable as an example 1. In this case, \*\*\*\* (1) And core part material (2) It may carry out and the same synthetic resin as an example 1 may be adopted.

[0026] \*\* . It is \*\*\*\* (1) at this example 2 as well as the above-mentioned example 1. While \*\*\*\* which does not prepare \*\*\*\*\* in upper limit is connected and the core part material (2) of these interior and (2) can enlarge opposite \*\* or the configuration which can be connected, then pile length up and down, the bearing capacity of this pile can be increased.

---

[Translation done.]



**\* NOTICES \***

JPO and NCIP are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**DESCRIPTION OF DRAWINGS**

---

**[Brief Description of the Drawings]**

**[Drawing 1]** The exploded view of the foundation pile of this invention example 1

**[Drawing 2]** The sectional view of this

**[Drawing 3]** The explanatory view in the placing completion condition of this

**[Drawing 4]** The explanatory view at the time of connecting the main cylinder section (1a) with two steps

**[Drawing 5]** The side elevation of the foundation pile of an example 2

**[Drawing 6]** The sectional view of this

**[Description of Notations]**

(1) ... \*\*\*\*

(2) ... Core part material

(3) ... Piece of support

(11) ... Cavity

(12) ... Opening

(21) ... Inclination pressurization side

(1a) ... Main cylinder section

(1b) ... Pile point cylinder part

(16) ... The 1st fitting cylinder part

(15) ... The 2nd fitting cylinder part

---

**[Translation done.]**

**\* NOTICES \***

JPO and NCIP are not responsible for any damages caused by the use of this translation.

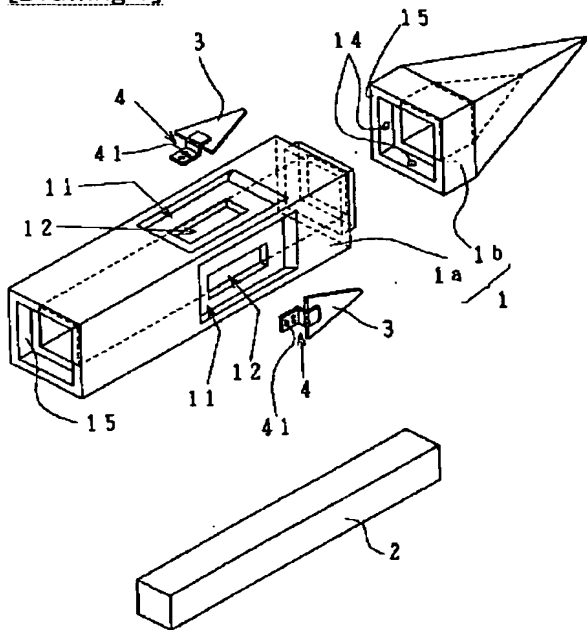
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

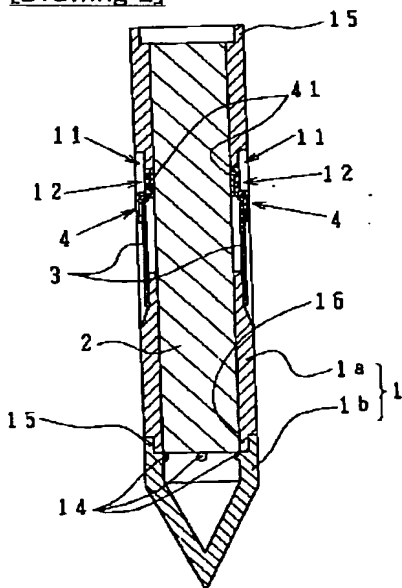
**DRAWINGS**

---

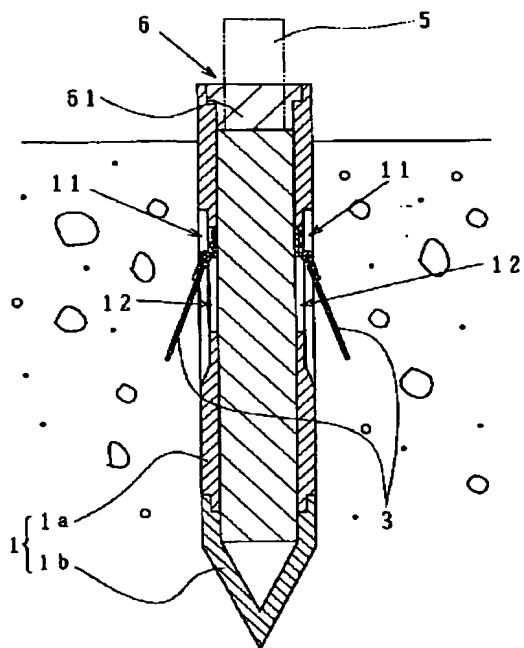
**[Drawing 1]**



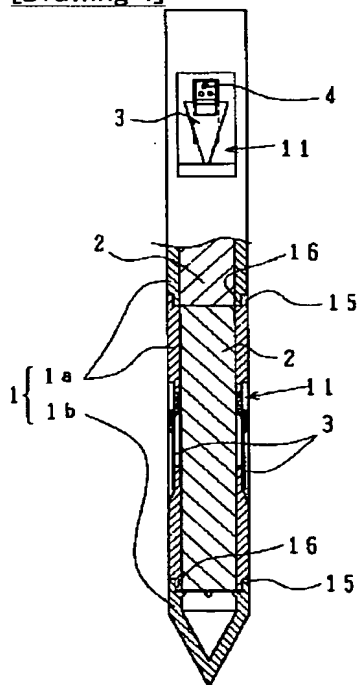
**[Drawing 2]**



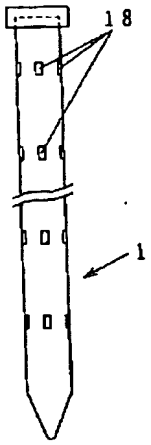
**[Drawing 3]**



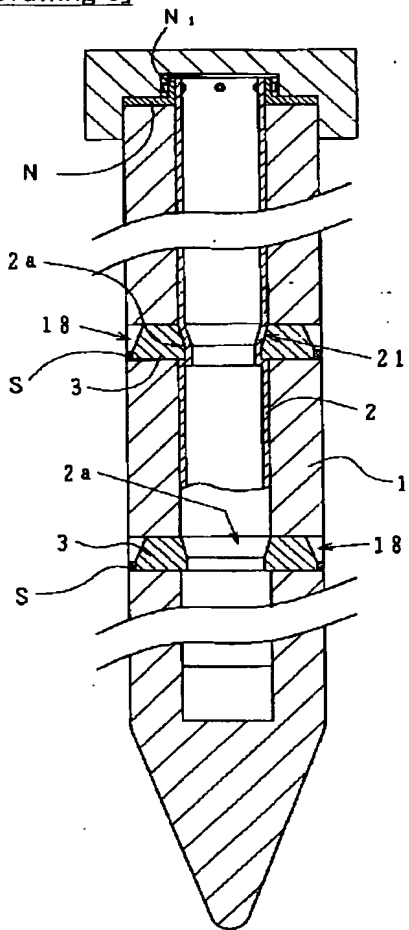
[Drawing 4]



[Drawing 5]



[Drawing 6]



[Translation done.]